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Canadian Journal of
PUBLIC HEALTH

VOLUME 44 TORONTO, DECEMBER 1953 NUMBER 12

What is Public Health?

EDWARD G. McGAVRAN, M.D., M.P.H.
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and
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I AM honored by this opportunity to speak to the Canadian Public Health Association.

I welcome this opportunity because I want to say something which I believe is terribly important to public health in Canada, in North Carolina, the United States, and in most countries of the world, and I covet your thinking and judgment upon the matter.

I speak with humility and hope to this audience because since entering the public health profession I have been continually impressed by the progressive leadership of Canadian public health; by the outstanding thinkers, teachers, and administrators in public health here in Canada, and those who have come to the United States from Canada to leaven our bread. Indeed, there have been times when I thought that the prerequisite for a good public health man was to be a Canadian.

With the rapid changing picture of health—health needs, health expenditures, health understandings—it becomes imperative that the purposes, objectives, functions, and missions of public health be clearly defined and understood, first by public health people themselves, and second, by other professions and the public at large.

What is public health? Is there a distinctive discipline of public health? Is there a profession of public health? These are simple questions, but the answers are not so simple. There is no agreement, even among our own ranks, as to our sphere of competence, as to the distinctive body of knowledge which

Presented at a dinner session during the forty-first annual meeting of the Canadian Public Health Association, held in Toronto October 1 and 2, 1953, in conjunction with the fourth annual meeting of the Ontario Public Health Association.

is public health. Indeed, there are many leaders in public health who maintain that public health cannot be defined. If this be true, it is no wonder that with the changing times there continues to be increased misunderstanding of public health by the organized medical profession; that there is apathy and indifference to public health on the part of the public and appropriating bodies of government; that there is lack of direction and planning among public health workers themselves; and that recruitment and training of public health personnel lags far behind the needs in every country and clime.

Surely this misunderstanding, apathy, uncertainty, and lag, justify more than serious consideration. It demands the finding of a suitable answer that can reconcile the widely divergent philosophies of public health now erecting a tower of Babel in our midst.

We are beset with extremes—with outdated terminology that serves only to confuse us and our friends; for example, some answer "public health is preventive medicine." I suppose no other definition has as great a following and as much lip service in common parlance. The Public Health Specialty Board of the American Medical Association, once titled the Board of Preventive Medicine and Public Health, is now called, simply, the Board of Preventive Medicine. The terms *preventive medicine* and *public health* are used synonymously by most of us, and yet the whole trend of medical education for the past fifty years, and accepted standards of scientific practice of medicine, make this definition a ridiculous sham.

The scientific practice of medicine has been more and more preventive in every shade of meaning of the word—prevention of illness, of crippling, of suffering, of death. The accepted patient-centered philosophy of medical practice is dependent upon preventive medicine. Pediatrics, obstetrics, and psychiatry have taken the lead in concentrating and focusing the attention of medical practice upon preventive medicine, of making it an integral part of the scientific practice of medicine. But general practice and every other medical specialty is similarly dedicated. For organized medicine or public health to cling to this terminology—preventive medicine as a line of differentiation between public health and medical practice—is illogical and unrealistic.

If we add, "public health is *part* of preventive medicine," we have accomplished nothing. What part? This puts us back to the starting point again.

Perhaps "public health is communicable disease control," or "public health is sanitation of the environment," or "public health is medical care of the medical indigent." I need not expand upon the inadequacy of such definitions to this audience; but these are concepts widely accepted in certain circles which help to increase the prevalent apathy and indifference of the public to public health.

The other extreme element of our profession answers the question "What is Public Health?" by broad generalization. Public health is everything that pertains to the health and well-being of people—physical, mental, emotional, and social—or "the mandate of the people," or "organized community effort." These are intriguing, but they do not increase the understanding of the medical profession or the public, nor do they inspire confidence. They are definitions

of health—the broad generic term of which public health can only be a part. They cover vast areas beyond the hope of competence of a single profession. They require bodies of knowledge beyond the possible grasp of any one profession. They leave to the lay public the determination of what is the professional competence in public health. They stimulate discord in the determination of what requires organized community effort and make certain only an infinite variety of right answers. There can be no stature in a profession which is unable to limit and determine its own area of competence. Suspicions and distrust are the inevitable fruits of such broad encompassing definitions.

There is, no doubt, honest difference of opinion. Most answers can be so interpreted as to be acceptable, but they are equally open to misinterpretation and misunderstanding. The proof of the pudding is in the eating, and I submit that, however good or bad the various answers, they haven't worked. There is no agreement; there is increasing controversy, misunderstanding, and division.

What, then, is public health? I believe we can answer that question. I believe that there is a public health profession distinct from the many basic health professions—medicine, dentistry, engineering, nursing, etc.—from which it has sprung. I believe there is a distinctive body of knowledge that determines our area of competence without limiting our objectives.

The answer is nothing new or startling. It can be stated simply. It can be easily understood. It defines but does not limit public health. It is based upon the experience of the medical profession in its growth of the past fifty years. Let us digress for a brief review of this phenomenal development in the medical profession. From it we may draw parallels and analogies for the profession of public health.

Advances in medical science have changed the whole face of medical practice in the last 50 to 100 years. The art of traditional empirical practice has changed to *scientific medical practice*. The major concern of medical science for many years remained bacterial-centered—segment-centered. Medical education concentrated upon what are now known as the *basic sciences*. Then came the revolutionary change from basic science to clinical science. The major issue of this change has not been new gadgets or new drugs but a new approach. We no longer treat the ulcer of syphilis with ointments, nor do we treat the spirochete; we treat the whole patient. The total patient—physical, mental, and emotional—is treated, not just a disease or segment of his body. This patient-centered concept of clinical science was a tremendous advance in scientific medical practice, vastly more important and significant than 606 or penicillin.

Modern medicine—clinical science—with its patient-centered concept of the total individual was not accepted easily nor without battle. For many years the bacteriologists, anatomists, and pathologists argued vehemently that the individual was not an entity but only an aggregate of atoms, segments, organs, etc., and they argued that "one could not diagnose an individual; that one could only diagnose disease, bacteria, and pathology; that one could not treat the whole individual but only broken bones, ulcers, and diseased members, and that only in so doing could the individual gain health." It was a long, hard battle which some of us can remember.

After acceptance of the physical entity of the individual along came the psychiatrists who insisted upon the physical and mental *oneness* of the individual. Later, the recognition of the importance of medical social factors in the health of the whole patient necessitated a knowledge of the family and community impact upon the health of the individual. This battle, started by Flexner and Osler, has been won and scientific medicine today does believe and teach that the whole patient—physical, mental, and social—must be the focal point of medical practice.

The parallel and analogy with public health is close indeed. Public health, too, has come from empiricism to scientific practice. We have grown through basic science and clinical science so that now the advance in health science makes possible the next step—the recognition of the community as a unit, as our new patient, an entity not merely an aggregate of people. An entity different from every other community as every individual is different from his neighbor. Different in its physical makeup, its geographic and demographic limitation; different in its social structure, its power structure, its governmental and legal structure. Different in mental and emotional patterns, its ethnic groups, its mores, its religious and nutritional patterns. Different in its educational procedures, its institutions, its community organization.

And yet, an entity with pride and prejudice, with wealth and poverty, with needs and accomplishment, with lacks and superfluity, with ignorance and wisdom, with weakness and with power, in illness and in health. *This is our patient.* And to this patient's health needs we dedicate our minds and hearts, our intellect, our lives. This is our patient for whom we must learn the art and the science of public health, upon whom we must practise the most modern and scientific diagnosis, in whose interest we must improve our methods, measure and evaluate our techniques, foster basic and applied research, and whose confidence, understanding, cooperation, and participation must be gained in each step and throughout the whole procedure.

Public health emerges from the patient-centered to the community-centered science, just as clinical medicine emerged from bacterial-centered basic science to clinical patient-centered science. And here the major issue again is not new gadgets or new functions, but a *new approach*, a *new focus*, a *new patient.*

In scientific public health, we no longer treat the individual—the segment of the community—but the total body politic—mental, physical, social, and economic. We no longer treat individuals with communicable diseases, but we prevent, control, or eradicate the disease in the body politic. The total patient is our responsibility, and not the individuals who are a part of it. Our patient, the community, is, however, more than a mere aggregation of individuals, just as the individual is more than an aggregate of arms, legs, kidneys, and eyes.

This does not mean that we ignore the individual any more than the physician ignores the ulcer, the segment, or the disease germ in the individual. The doctor treats the broken hip, but only incidentally to the treatment of the individual. On occasion he may not even attempt to set the broken hip because the total health of the individual is more important, but if he does

set the hip he does it only for the purpose of curing the individual functionally. The day has passed when we could say "the operation was successful but the patient died."

The analogy with scientific medical practice goes much further and continues to be helpful in our analysis. Public health will have to continue to do many things for individuals that society demands. The health officer may have to be the county coroner, or jail physician, until a proper medical examiner system is adopted, or until other physicians can be persuaded to assume the duties of individual medical care for the inmates of our penal institutions. But the health officer is not doing public health when he does these things. He is doing, I hope, the scientific practice of medicine, and I hope he will be relieved of these duties shortly to free him for the best use of his new and singular public health skills and knowledges. The health department may have to continue to conduct well-child conferences, immunization clinics, etc., for individuals—indigent or otherwise—until organized medicine finds a better way to maintain community immunity. The purpose of these clinics should be better protection for the health of the total body politic rather than for the health of any one individual in that body politic.

Such community-centered philosophy of public health is not easy to accept. Many will oppose it as vehemently as the basic scientists once opposed the patient-centered philosophy of medicine. To the opposition, a community is but an aggregate of individuals. To them a community can be cured only by curing individuals. More doctors and hospitals are all that is needed. This battle may be bitter, but the first round has already been won by the patient-centered philosophy. The odds favor community-centered philosophy for the second round.

Medical science, fifty years ago, focussed upon scientific diagnosis and treatment of diseases. We have characterized *medical practice* today as the scientific diagnosis and treatment of the whole individual. We can now characterize *public health practice* as the scientific diagnosis and treatment of the community as an entity—the whole community—the body politic.

Public health is, then, the scientific diagnosis and treatment of the body politic.

Acceptance of this answer calls for a democratic team of professional equals. The very complexity of society, rapid advances of social science, bear directly upon the public health. It immediately becomes obvious and essential that many other professions with many other skills and knowledges must be integrated into scientific public health to obtain a diagnosis and plan of treatment for the body politic. But the democratic team concept can never be applied to community health so long as the confusion exists between individual health and community or public health; as long as we confuse patient-centered medical practice with community-centered public health practice.

Patient-centered medical practice is, has been, and will be always medically dominated and controlled. This is the area of competence of the M.D.; this is the body of knowledge that is scientific medicine. Other health personnel in this area are ancillary—subordinate or para-medical personnel. The eminence of the physician is unquestioned.

Now it is equally obvious, as we face the extremely complex unit we call the community—the body politic—the patient of public health—that no individual, no individual-centered profession, can have all the knowledges and skills necessary for the diagnosis and treatment of its health status. No profession can "play God." Medical science no longer has a corner on the knowledge of community health.

To diagnose community ills we must have knowledge of community economy—the distinctive skills of the economist, a knowledge of the social structure of the community, the cultural patterns of the different groups of the community, and the impact upon their health practices of nutritional or living patterns of recreational, religious, moral, and ethical patterns. Frequently this knowledge is necessary for varying groups within a community and the effect of these upon the other groups in the community.

We must have knowledges and techniques of community organization of the power structure of that community, of the political structure, of health laws and regulations, of attitudes that determine acceptance or rejection of change and development. We must have sophisticated knowledge of education and educational methods, of mores and morals that affect the growth and development of community consciousness and community action. These are not just words; they are the vast accumulation of knowledge of the social sciences.

We must have knowledge of community measurements, of the demographic characteristics of our patient—the age, sex, racial distribution, and the intricate ways in which this affects our patient's health; the biostatistical techniques of collection and analysis of the data that can determine mass phenomena of disease and health; the geographical base that determines isolation, transportation, and resource.

We must have the knowledge of sanitary science, technical skills that can determine oxygen demand or biologic balance under widely varying circumstances. We must know the epidemiology of the mental health of our patient, the community, and develop techniques to assess the early symptoms of community illness, physical or mental. We must have the knowledge of mass nutrition, mass disease, epidemic phenomena that provide a scientific prognosis and plan of treatment or evaluation of the past or present programs aimed at control.

All of this is nothing more or less than a scientific approach to the diagnosis and treatment of the body politic—the history, the physical examination, the tests, the analysis, the clinical judgment, and the prescription for treatment.

The doctor has much to add to this team because his knowledge and approach to the individual is excellent background for this further training and experience upon the much more complex organism he now faces, but the doctor's supremacy is gone. A democratic team of individuals of diverse backgrounds and skills form a profession of public health that must cope with a different kind of patient. The advances of health science and social science, not medical science alone, have shown us the way to immeasurably lift the health and wealth of our patient. But we must be free to develop and practise that science upon our patient, the community.

Public health is the scientific diagnosis and treatment of the body politic or community.

Acceptance of this answer will not only make possible a truly democratic team organization in public health, it will do four other tremendously important things for public health. First, it will eliminate much of the mistrust and fear of organized medicine, with all of its ramifications. Fear and distrust are associated with a lack of knowledge of our objectives and goals—"where we are going"—and whether in so going we will infringe upon the field of *their* professional eminence—the health of individuals. Since we don't agree as to where we are going ourselves, I don't quite see how we can expect the medical profession to know or to have much confidence or trust in our objectives. This answer not only says where we are going but it defines our areas of competence. It also accepts the physician's eminence and leadership in the field of individual health. It says to the M.D., in essence, our job is to diagnose and treat the community, to determine its health needs—a field in which you are not qualified by your patient-centered training.

We will work on individuals only for the purpose of community health, except as the community demands that we as public servants do medical care of individuals. And this we will do under protest—that it is not our function, not public health, and as soon as it can be taken over by those whose responsibility is individual health, we wish to be relieved of it. We expect the right to examine our patient as you have the right to examine yours. If that examination reveals community need, say a low community immunity against diphtheria, we will assist the private physician in every way we can to do immunizations of individuals and will resort to health department clinics only as a stop-gap if the community immunity levels cannot be otherwise raised to a safe level. This is nothing new; we just haven't said it clearly before and have left in the minds of the physicians the idea that we were going into the immunization business and other patient-centered business, which, unfortunately, too many health departments have done.

By this answer we say clearly and firmly that public health is not the administration of medical care to individuals, indigent or otherwise, but we cannot avoid determining the need and adequacy of medical-care programs originating and functioning through the medical society and individual private physicians or governmental agencies. It is the fear that public health plans to take over individual health that makes medicine rightly suspicious of the whole public health program.

Public health is the scientific diagnosis and treatment of the body politic.

Second, acceptance of this answer will stimulate the proper use of time and funds of public health people themselves. This answer demands more direction and planning of scientific public health programs.

The first criterion of scientific *vs.* empirical practice is a careful and complete history of the patient. What do you think of the doctor who doesn't take a history, doesn't ask what your trouble is, where your pain is, but just gives you a pill? He is a quack, or if we feel charitable, he is too busy practising medicine, "but not on us." Now, let's take a look at our health department.

Do any or all of the team, that is the doctor of the body politic, have a complete history of the patient? Seldom, in a great many studies and surveys of local health departments and other health agencies, have I been able to obtain even an incomplete history of their patient. You may know how many immunizations you did, but do you know what percentage of the body politic under age two is protected against diphtheria, whooping cough, tetanus, or smallpox? Do you know what percentage of pregnant women are getting good, adequate medical supervision? We are full of data upon the indigent, upon this group, upon that group; but a complete history, no! We don't even attempt to make it; we haven't the time.

Vital statistics is only a pitifully small segment of the health history of the individual or the body politic. We too frequently don't even know what other agencies, public and private, are doing for our patient—our community. Have you asked your patient what he thinks his chief complaint is? Does your patient have a way or means of expressing himself to you concerning his health? Your patient is all the people, not just the doctors, or the bankers, or the businessmen, or the politicians. We must maintain and develop means of getting grass-root answers, representative community opinion. If we are honest with ourselves, we will admit that a complete history of the health of the body politic is not available in most health departments, and certainly you don't and can't have it at a provincial or national level when you don't have it at the local level.

The second criterion is a thorough examination of the whole patient. What do you think of the doctor who does not strip the baby for examination? Well, we don't take our children to him. But the health department—it's hardly necessary to tell you that we don't examine the whole patient and seldom even a part of him. We have a good excuse; "we haven't time; it would offend the medical profession" if, for example, we determined the percentage of mothers getting poor prenatal care. So we can't do that. The cold facts are a pretty bitter pill to swallow. We are responsible for the health of the body politic and we have never *once* examined the patient completely and thoroughly.

Along with this examination by the physician go certain laboratory tests, the third criterion. Advances in *medical science* provide new and essential tests for the individual constantly. This is one of the reasons for the increased cost of medical care. The advances in *health science* provide for new and essential tests upon the body politic to aid in determining *community* needs and lacks, a *community diagnosis*. Special tests on a mass basis are extremely expensive. Ingenuity reduces this expense; for example, the large X-ray to the microphotograph, from $10 to 50c per person. We have done pretty well with this test, but we still have chest X-rayed only a part of our patient, unfortunately too often the most unlikely part. In many of our communities our mass screening has been directed at the young adult population 15–35 years of age where pulmonary T.B. is at its lowest incidence and those over 55 years of age who have six times as much active T.B. are missed. Routine screening of all hospital in- and out-patients is still not generally done, although this is ten times as productive a case-finding area as screening industry. We have chosen to screen Negro population in the United States instead of white

population despite the known greater incidence rates of active T.B. in the white population at any one time. We have concentrated our efforts upon the 10 per cent source of new cases and done nothing about the 90 per cent source of new cases each year in most of our T.B. control programs. If the doctor X-rayed the long bones to discover tuberculosis, he would be more sensible than the mass screening that has *so often* been done by health departments, apparently avoiding the very segments of the body politic in which the disease is most common and prevalent.

The last criterion of scientific public health is a plan of treatment. We are desperately in need of planning in public health. We are so busy doing the immediate "first aid" that we don't have time to think of the year's program, and particularly the long-range program. The plan of treatment must include continued analysis of the result of present treatment. Here again we tend to set up programs, not because they are calculated to meet our community's needs, but because they are popular or traditional, or money is available. It is, however, dangerous to make plans on insufficient evidence. Scientific planning is not done chiefly because none of the other criteria of scientific public health has been fulfilled. A complete and careful history of the patient has not been obtained. A complete and thorough examination has not been done. Neither have the laboratory and X-ray tests that are available been used. A scientific diagnosis has not been made, let alone written down. A scientific plan of treatment cannot be made, long- or short-range.

As we take our place in the professions of tomorrow, the public health profession must cease to practise empirical, traditional public health or bacterial-centered or patient-centered medicine, and must start building right now a sound scientific approach to public health. In exactly the same way as medicine has come from its era of empiricism and bacterial-centered science, public health may also emerge from empiricism and patient-centered science to the scientific professional public health practice. But only if we *limit* our effort through our area of professional competence—community health—the diagnosis and the treatment of the body politic.

Public health is the scientific diagnosis and treatment of the body politic.

Third, acceptance of this answer will do much to eliminate the indifference and apathy of the public. The public is confused. They have been bombarded with patient-centered propaganda in recent years that all they need is more hospital beds and more doctors and their health problems will be solved. This kind of drivel, if repeated enough like Hitler's "big lie," is readily believed because of the human frailty of egocentricity—a form of selfishness to which we are all prone. But its ridiculousness in the face of history and experience hardly justifies comment.

Let us pause for just one illustration. The Empire State of New York has as many doctors per capita, or more, as any other state in the United States and I dare say as any province in Canada. It also has, and has had for many years, tuberculosis hospital beds, adequate new equipped hospitals, and sanatorium facilities beyond their needs. If doctors and hospital beds are the keystone of a tuberculosis control program, the public should rightfully

expect a far superior tuberculosis record in that state compared with many other states with fewer, inadequate tuberculosis hospital beds with one-half or one-third the number of doctors per population.

Actually, New York State is among the six states with the highest tuberculosis death rate, is among the six states with the highest rate of tuberculosis cases, and it has experienced similarly the slowest rate of decline in death rates and case rates of this disease during the past ten years.

The important matter of community health can have no place in an exclusively *individual-centered philosophy of health.* Apathy and indifference to public health is the only logical attitude of the public so long as we allow the confusion to continue between individual health and community health, or that community health is just the aggregate of individuals' health and that more hospital beds and more doctors are all that is needed. As soon as the public sees public health as a scientific specialty, limited to the diagnosis and treatment of the community's needs, and competent in that field alone, they will recognize the overwhelming importance of that discipline to them and support it as generously as they have individual medical care in the past half century.

Public health is the scientific diagnosis and treatment of the body politic.

Fourth, acceptance of this answer will change the whole face of our number one problem of public health—the recruitment and training of public health personnel. Let us take, for example, one type of personnel, our greatest lack and shortage, the trained and qualified health officer. It has been wisely said that nothing is as important in recruitment of any profession as challenge. I know the excuses, good excuses, of poor employment practice, inadequate compensation, lack of professional recognition. They all play a part, but the reason we are not recruiting the cream of young M.D.'s is that we have offered no challenge, no stimulating and daring future. Administration—paper work—does not appeal to a man faced with opportunity of service to the sick. The challenge of diagnosis is the real drawing card, focusing all of his attention and his talents upon the discovery of disease, of illness and its cure. If we could go to such young men and say here is a new patient, infinitely more complex than the individual you will be working on, a science in its infancy compared with medical science; a patient needing diagnosis that demands all of your diagnostic acumen and then some; these are relatively unchartered seas with opportunities for human service and good much greater than anything you have dreamed of; here is a specialty that is dangerous because you will enter it with no "God-given authority" and "supremacy;" you will earn your leadership if you have it in you; here your successes and failures are not counted in scores but in thousands and hundreds of thousands—by this kind of challenge we could begin to skim the cream from the top instead of scraping unsuccessfully the bottom of the barrel. But we dare not, in good faith, make this challenge until we accept this answer that clearly places us in the limited specialty position, with responsibility for the diagnosis and treatment of the body politic. The smart young men of medicine will not be sucked in by the

glittering generalities that public health is everything, or the reverse, that it is limited to administrative boredom.

What is public health?

Public health is the scientific diagnosis and treatment of the body politic.

I hold no brief; I carry no torch for *this* answer. I will espouse as readily any other that holds as much opportunity for public health progress. But I know of no other answer that holds as great potential good for the health and well being of our people. The need is for clearer thinking, clearer purpose, more refined and defined objectives. What is your answer? The hour is already late. Fellow public health workers, "Quo vadis"—"whither goest thou?"

Health Education in the Province of Quebec

JULES GILBERT, M.D., D.P.H.
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Ministry of Health
Province of Quebec

IT is well known among us that the work of all hygienists should be based on health education. We should like to explain the way in which, in the Province of Quebec, we are attempting to attain this ideal.

The hundreds of employees of the Ministry of Health, in our 67 County Health Units and some 150 settlements, are responsible for the health education of individuals and families, and bring its benefits to all whom they contact and the many homes they visit. Moreover, they attempt to reach groups or the public as a whole, in order to instruct them on the many aspects of personal and public health.

In 1943 the Ministry established a Division of Health Education, to add orientation, stimulation, and coordination to the educational efforts of its staff members. During the past ten years, this Service has attempted to intensify the health education program generally. In order to make it more methodical, more systematic, and more continuous, it has assigned the health education of groups and communities to public health nurses who have undergone supplementary training in its methods and principles.

When it addresses itself to a group or a community, health education uses balanced proportions of psychology, pedagogy, technique, and organization. Our pattern of work had already made the public health nurses responsible for health education among individuals and families. The last decade has shown here that with the necessary training, as given by the School of Hygiene of the University of Montreal, those who possess the desirable qualities and have an aptitude for this kind of work, can do an excellent job when working with groups and the public at large, at the local level.

The nature of the training of our public health educators is as follows. The academic work is incorporated in the course taken by all students registered in Public Health Nursing. It comprises the following subjects (omitting those related to the many other aspects of public health): sociology, 20 hours; psychology, 20 hours; pedagogy and methodology applied to public health nursing, 45 hours; psycho-pedagogy, 10 hours; public health education (principles, technique, and organization), 30 hours; public speaking (exercises), 20 hours.

At the end of the year, the candidates who have been selected to be health educators have a one-month period of field work with two public health educators in practice (two weeks with each one) and a two-week advanced

Presented before the Health Education Section at the forty-first annual meeting of the Canadian Public Health Association, held in the Royal York Hotel, Toronto, September 30–October 2, 1953.

course with the Nutrition Division of the Ministry of Health, in which they study the technique of nutrition education.

The functions to be carried out in their program of community health education are those approved by the American Public Health Association in 1948 and described in its report, "Educational Qualifications of Community Health Educators." It must be said, however, that public health nurses, when trained as public health educators, apart from acting as organizers and interpreters whenever necessary, carry out much of their program themselves and rarely call upon persons in allied fields to help them. This no doubt is made possible by their nursing background.

At present (October 1953) thirty public health nurses devote all or most of their time to public health education in their County Health Units. Six additional nurses are currently under special training for the same purpose. This, however, does not exclude the participation of the other health workers in the job. Similarly, at the provincial level, technicians from other disciplines, such as journalists, publicists, film producers, script writers, etc., can play an important part in the preparation of materials. When employed full-time in a health department, such technicians are advised to study the health subjects that can be useful to them.

Public talks, classes and discussions in study groups, radio programs, press releases, articles in periodicals, printed materials, films, slides and exhibits, are the procedures utilized regularly by our public health educators.

Administratively, each one is under the direction of her health officer, like the other members of the staff; she submits her plans to him, follows his instructions, and gives him all the information he needs for the conduct of his health unit. Technically, she may or may not follow the suggestions received from the Division of Health Education. It is to be remembered that, although such suggestions are probably sound in principle, their application may better be postponed or modified because of local circumstances, according to the judgment of the health officer.

The suggestions are sometimes offered during field visits made by the Director, but more often are contained in a monthly bulletin called "Liaison", now in its ninth year of publication. As its name implies, it serves as liaison for the public health educators. From the reports of local activities, points of common interest are made known to all; new materials are described; and many ideas are exchanged on matters of principle or method.

Apart from many technical documents, each health educator uses freely the films and the projection services of the Cinephotography Branch of the Provincial Government. She also distributes wisely the publications in stock at her health unit; the Division of Health Education supplies the official publications of provincial and federal origin, but the health educator frequently obtains pamphlets from other sources, when their distribution is approved by the local health officer.

Some fifteen city health departments, independent of the Ministry, are expected to conduct their own program of public health education. Montreal's program reaches mostly by mass media, the press and the radio, the population of over a million people living in that metropolis. These city health departments use materials of their choice. Since health education is considered

a basic activity of local health departments, their autonomy in the matter is completely respected by the Province, which furnishes them with its own publications only at their request.

On the other hand, several voluntary agencies prepare educational materials and launch drives in connection with their special objectives. Official services use some of their materials and integrate the campaigns in the continuous program of health education.

Once every two years, all health educators are invited to a three-day meeting in Montreal. At such conferences, they discuss their problems and work together toward the betterment of their program. This is particularly useful to new health educators.

Never at any time during the past ten years has any pressure been exerted by the Division in order to increase the number of activities of the public health educators; interest is manifested only in the technique of their work, since we believe that the ultimate result of health education depends on quality rather than quantity of educational efforts.

Nevertheless, those who are not familiar with this movement may wonder if it has anything to show that justifies its continuation. We shall not attempt here to measure the results of health education in terms of mortality or morbidity statistics, or even of changed behavior.

We have no intention of crediting health educators alone with improvements that may be due to education from other sources and that were probably influenced by factors related to health, but unrelated to health educators (the economic conditions are an example of such outside influence).

Further, we see no point in trying to evaluate the results of educational efforts integrated in preventive services offered to the public by a team of hygienists who, in order to coordinate their work, must forget their personal prestige and be content with the satisfaction to be derived from a job well done.

Notwithstanding, we should like to give just an indication of the impetus an educational program receives from the services of a health educator. From the last published report of the Ministry of Health (1951), two groups of County Health Units were compared as to certain educational activities. The units in one group had a public health educator on the staff, the others did not.

The figures presented in the table relate only to work done with groups and communities. It is to be noted that the official report unfortunately contains no data on radio programs and exhibits. The data concerning lectures on sanitation, dental hygiene, and school hygiene have been left out, since

COMPARISON OF HEALTH EDUCATION PROGRAMS DURING 1951 IN CERTAIN COUNTY HEALTH UNITS, PROVINCE OF QUEBEC

Quantitative Evaluation of Educational Activities in Two Groups of 14 County Health Units, One Group with Public Health Educators and the Other Group without

	With Educators	Without
Lectures on general hygiene	931	89
Classes for young girls	157	71
First-aid classes	164	8
Film showings	399	102
Press releases	325	115
Lectures on maternal health	61	27
	2,037	412

those activities are usually the responsibility of members of the staff other than the health educator.

From the figures given, we can see that, on the average, the activities listed were five times more frequent in the units in which there was a health educator.

But by far the most important phase of health education is that which takes place at the school, when habits are formed, knowledge is acquired, and a favorable mentality can be developed. Adult education cannot and should not replace child education; it aims only to supplement it.

Our school instruction program is modern and good, but its implementation naturally depends on the competence of the teachers. The 22,000 teachers in our 10,000 schools will teach health properly when they have been trained adequately in Normal schools by school health educators professionally qualified in hygiene as well as pedagogy. We know of only one Normal school in the Province where the services of such a teacher are available for this purpose. Yet we have more than fifty health educators engaged in our school system in some other capacity, who have qualified at the School of Hygiene of the University of Montreal or, in the case of a few, at a school of public health in the United States.

The health program of our Normal schools is being revised at the present time. It is probable that the new program will call for the appointment of school health educators in the ninety or so Normal schools and scholasticates, where our future teachers, lay and religious, receive their professional training.

In the meantime, the services of our public health educators are always available to the teachers in practice, either in large pedagogical meetings or, preferably, in small study groups, to help them with the orientation or interpretation of the program, the solution of problems, or the procurement of teaching materials.

One French-speaking Order has a series of health manuals in preparation; two have been published and officially approved for use in the first three grades. In the Protestant school system, a series of excellent manuals has been adopted and the program is based on them. In both school systems, many good films on health and hygiene are available and constitute important teaching aids.

The Department of Health and Social Medicine of the Faculty of Medicine, McGill University, has just appointed a qualified and experienced person as assistant professor in health education. Among other duties, the new appointee will be concerned with a program for the school-age group. The Department will provide special courses for teachers of the Protestant School Board of Greater Montreal and will act in a consultant capacity to the Board's health program, in which it is envisaged that demonstrations will be undertaken in selected schools.

We have attempted to describe the way in which, in Quebec, the public, the school, and the professional health education programs are interlocked and how they support and supplement one another. We hope we may conclude that, through the program of our health units or departments, voluntary agencies, and the Public Instruction Department, and with the help of the School of Hygiene, our Province is moving slowly but surely along the road to better health education.

Non-Specific Urethritis

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THERE has been a considerable amount of discussion during the past few years, both in Britain and on the North American Continent, regarding the growing prevalence of urethritis of non-gonococcal origin.

It is probable that a large variety of non-gonococcal organisms has always invaded and infected the male urethra, sometimes with and sometimes without the association of gonococci. To what, then, do we owe their present apparently increasing prevalence?

Before the penicillin era, most cases of urethritis in the male were treated by irrigations with various bactericidal agents until all symptoms had subsided. This would have the effect of gradually washing out and eliminating *all* organisms. Moreover, since many cases were being diagnosed as gonorrhoea on clinical evidence alone, without bacteriological confirmation—as indeed in many instances they still are—it is difficult to say how many of these "clinical" cases were in fact due to "non-specific" organisms.

The subject of non-specific urethritis assumed greater importance, or received greater recognition, when sulpha drugs and penicillin replaced the old irrigation methods in treatment. It was then found that, although usually highly successful, these substances frequently left patients with a persisting urethral discharge. These cases were all then thought to be treatment failures.

Various surveys were carried out from time to time in many parts of the world to assess the effectiveness of penicillin in the treatment of gonorrhoea, and in most instances 94–96% of bacteriologically proven cases appeared to respond favourably to a single injection of an adequate dose of penicillin.

Two such surveys were carried out in the Venereal Disease Clinic at Vancouver, British Columbia. In the first series a dose of 300,000 units of procaine penicillin in oil, with aluminum monostearate, was used in treatment, with a cure rate of 96%. In the second series, 1,200,000 units of the same preparation were used, with the same results. Over 300 cases composed each series.

More recently,† a further survey was carried out. This included 500 consecutive cases of bacteriologically proven cases of gonorrhoea, which were treated with a single injection of 1,200,000 units of P.O.A.M. Treatment failures amounted to 8% (40 cases) in this series. All these 40 "treatment failures" returned within one to two weeks with a continuing purulent or mucopurulent discharge which required a considerable amount of alternative treatment to clear it up. In 35 of these cases all gonococci had disappeared from the pus

*2700 Laurel Street, Vancouver, B.C.
†July to December, 1952.

after the first injection of penicillin, while of the remaining five, four had negative cultures, though their direct smears showed organisms suggestive of gonococci.

The question now arises as to the significance of this 8% of patients with gonorrhoea who have failed to respond symptomatically to a single dose of penicillin. Are they indeed due to the persistence of pockets of undestroyed gonococci, or has there been a concomitant infection with other types of bacteria which are insensitive to penicillin? The additional measures which were required to effect a cure in these cases strongly suggest that the latter explanation is in the majority of instances the more probable one, though in the pre-penicillin era, continued irrigations would probably have effected a cure without this question ever having arisen.

The 500 cases of gonorrhoea mentioned above consisted of a part of a larger survey of all cases of urethritis in males occurring during the period. The total number of cases recorded was 667, of which 500 were gonococcal and 167 non-gonococcal. Thus, the number of cases of non-specific urethritis occurring during this period comprised 25% of all cases of male urethritis seen at the Vancouver Clinic. In addition to this, there is reason to suspect that in most of the 40 cases of gonorrhoea that failed to respond to penicillin, there were non-specific organisms complicating the disease.

This gives some idea of the importance of the problem of non-specific urethritis in any program of venereal disease control. Since we have now ceased to use irrigations and are relying entirely upon antibiotics in treatment of all urethral discharges, it becomes necessary to formulate some plan of campaign in those patients whose urethral discharge is of non-gonococcal origin. Furthermore, any such plan, if it is to be financed from public funds, must, if possible, combine effectiveness with reasonably low cost. It was with the object of trying to determine this combination that the present study was undertaken.

Infecting Agents

It was unfortunate that adequate laboratory assistance was not available for the culture and typing of non-specific organisms. This somewhat limited the scientific scope of the present study.

Bacteria found to be present on direct smear appeared usually to be a mixed flora, usually of staphylococci, micrococci, pneumococci, and occasionally gram-negative bacilli of coliform type. In a fair proportion of cases, no organisms of any type could be detected, though cultures from these usually grew many colonies of staphylococci. In view of the increasing tendency to incriminate pleuropneumonia-like organisms (P.P.L.O.) as a causative factor in some cases of urethritis, it would have been of considerable interest to investigate many of the apparently sterile discharges along these lines, but facilities were not available. In the majority of instances, after the preliminary treatment of non-specific urethritis with 1,200,000 units of P.O.A.M. the discharges became apparently sterile but still persisted—frequently unaltered in type and quantity. It may here be stated that no case was admitted for this study unless smears from the discharge showed large quantities of pus

cells. This led to the question as to whether the mixed organisms seen in the preliminary smear were in fact the causative organisms or merely secondary invaders, with some type of virus or P.P.L.O. as the primary invader. A few cases were found to be infected with trichomonas, and responded fairly well to atebrin.

The incubation period of the non-specific urethritis group showed wide variations, from 2 days to over 3 months. This latter period is so long that its authenticity is open to considerable question. However, the average incubation period appeared to be about 10 to 13 days—somewhat longer than that for gonorrhoea.

Treatment

In view of the lack of full laboratory assistance in this investigation of non-specific urethritis, it was decided to treat all patients in the first instance with the usual 1,200,000 units of P.O.A.M. Those cases not responding to this injection were then further reviewed and additional alternative treatment given. Some were given 1 gram of streptomycin intramuscularly daily for 3 days, while others received sulphadiazine in doses of 1 gram four times daily for 7 days.

Reference to the table will show that 85 (51%) cases responded to a single injection of penicillin alone, whereas the remaining 49% required additional treatment. The remaining 82 cases were all re-treated with either streptomycin or sulphadiazine, and 63 of these showed a satisfactory response. Sulphadiazine seemed to be slightly more effective than streptomycin in clearing up these remaining cases. The 19 patients who still presented symptoms were then re-treated with streptomycin or sulphadiazine, whichever they had not previously received. Only one case failed to respond to this third course, and he responded readily to a three-day course of aureomycin, in which a 250-mgm. capsule was given four times a day.

TABLE I

	No.	Aver. Age (Years)	Incub. (Days) Average	Type of Discharge		Response					
				Purulent or Mucopur.	Watery or Mucoid	Pen. Alone	Pen. + Strep.	Pen. + Sulpha-diazine	Pen. + Strep. + Sulpha-diazine	Pen. + Strep. + Sulpha. + Aureomy.	Strep. or Sulpha.
N.S.U.	167	31.3	13.3	108	59	85 (51%)	24/35	39/47	18	1	
Gonorrhoea Treatment Failures	40					—	16		13		6

Reference to the table will show that 47 of the penicillin treatment failures were treated with sulphadiazine, and 35 with streptomycin. These showed a cure rate of 83% and 68.6% respectively, so that the sulphadiazine course appeared to be a little more effective than the streptomycin, though if the latter antibiotic had been used for the seven days, as was the sulphadiazine, there might have been very little difference in cure rate between these two modes of treatment.

Although only one case in this study required a course of aureomycin in addition to penicillin, sulphadiazine, and streptomycin—to which he readily responded—several cases have since been treated with this antibiotic, with a high cure rate. Indeed, aureomycin and terramycin, both of which have been used at the Vancouver Clinic in limited quantities, would seem to be considerably more effective than either sulphadiazine, streptomycin, or penicillin.

Complications

It is obviously impossible to determine whether or not any late complications are likely to occur, but there is no reason to anticipate any marked difference in this respect from patients adequately treated for gonorrhoea. Early complications were also not seen in this group, though one case of monarticular arthritis (knee) and one case of acute conjunctivitis have been seen during the past year at the Vancouver Clinic during treatment for non-specific urethritis. The incidence of these complications is therefore probably as great as in gonococcal infections, though in both conditions, provided treatment is early and adequate, complications are now rare.

The question now arises as to whether this polyglot of urethral infections should be regarded as venereal disease, and if so, what should be the attitude of public health authorities towards it. In the past, sexually acquired urethritis of gonococcal origin alone has been recognized. Non-gonococcal urethritis, however, is in most instances acquired and disseminated by sexual contact. It produces a purulent discharge and symptoms of burning in the urethra after a variable incubation period. Early complications of arthritis and conjunctivitis are known to occur in a few cases. Finally, the symptoms are equally distressing to the male patient. In view of these facts, it would seem to be somewhat illogical to select for treatment in government clinics only those cases of infectious urethritis due to one organism—the gonococcus—and to ignore all others.

Admittedly, the establishment of the identity of infecting agents in non-gonococcal cases is often difficult, time-consuming and expensive, and perhaps not feasible in public institutions whose finances are limited by government grants. Moreover, the time taken to investigate a case would lead to unnecessary and unwarranted delay in commencing treatment.

However, in view of the wide range and spectrum of antibiotics available at the present time, it would seem that a routine scheme of simple laboratory and treatment technique could be devised to meet the situation in the majority of instances.

The diagnosis is arrived at largely by exclusion. A patient reporting with a purulent urethral discharge and burning micturition, but in whom gonococci cannot be found either by smear or culture, is obviously assumed to be suffering from a non-gonococcal urethritis. Any patient who complains of cutting pains, or whose discharge contains blood, must obviously be subjected to more careful examination at the hands of a urologist, as also should those patients who continue to show a mucoid or mucopurulent discharge after having received the full range of antibiotics.

Patients consulting a private physician, and for whom expense is no great

concern, may well be treated with terramycin or aureomycin, for this is the treatment most likely to effect a cure in a few days. Responsibility for the universal supply of these drugs free of charge, however, should not at present be accepted by public health departments.

However, if non-specific urethritis is to be accepted and treated as a venereal disease by government clinics, some compromise will obviously be necessary while the cost of aureomycin and terramycin remain at their present high level. In order to make this temporary compromise, it is suggested that all cases be treated routinely with penicillin in the first instance. Although laboratory tests show that most of the organisms are insensitive to penicillin, it has been shown in this series that approximately 50% of the actual cases respond to a single large injection. Those which do not respond within three days invariably show a very marked decrease (and occasionally an apparent abolition) of recognizable bacteria from the discharge. If these failures are then re-treated with sulphadiazine for one week, approximately 90% of the patients will have been cured. The cost of treating the remaining 10% with aureomycin over a period of three or four days would not then be great, and effective treatment could be ensured for all.

Summary

Over a period of six months in the Vancouver Clinic, non-specific infection accounted for 25% of all cases of urethritis. The proportion is steadily increasing.

Non-specific urethritis, which apparently follows venereal contact, and which therefore would appear to be an acquired infection, should be regarded as "venereal disease." It should be recognized and treated as such by venereal disease clinics, with certain reservations.

The most rapidly effective treatment is probably a course of terramycin or aureomycin. However, in view of the expense of these antibiotics it is suggested that a less expensive routine be adopted, using penicillin in the first instance. This might be expected to effect a cure in 50% of cases. A subsequent course of sulphadiazine would eliminate approximately another 40%, leaving only 10% to be treated with the more expensive antibiotics.

Failure of the Wetzel Grid to Indicate Specified Types of Malnutrition

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THE Wetzel Grid (1) has been receiving attention as a method for measuring human growth, as distinct from height and weight alone. The Grid provides standards for growth direction and for developmental level that are claimed to be independent of race, sex, weight, size, or shape. "Deviation from a normal Grid pattern signifies that the child is not doing as well as may be expected. It may mean oncoming malnutrition, allergic or endocrine disturbances, or a developing disease process" (2). The Grid has been particularly recommended for screening school children, as by a school nurse, in order to save the time of physicians (3,4), even though the correlation of the Grid with clinical findings is poor (4,5). For further discussion and other references see the recent paper by Hill (4).

The present paper reports the failure of the Wetzel Grid to separate school children into groups according to the prevalence of various unhealthy conditions found by a medical and dental examination. More than 500 children were studied over a period of 2 to 4 years.

It should be noted in passing that preoccupation with growth rates alone is likely to be misleading in nutrition and health generally. Many nutritional recommendations have been made because experimental animals (or children) grew faster, or achieved a greater size within a specified time, on one diet than on another, without any demonstration that they were actually healthier. This possible fallacy in much nutritional work at present is found also in the Wetzel Grid; it is not established that children who grow and develop a bit more slowly at one time than another are necessarily less healthy than those who follow a steadfast course (in the channel). This is especially true if the ultimate effects, into old age, are kept in mind; it is possible that degenerative diseases of middle and later life may be related to early attempts to achieve "maximum" growth.

PROCEDURE

In 6 Indian Residential Schools across Canada, 1 in Nova Scotia, 2 in Ontario, 2 in Alberta, and 1 in British Columbia, each having about 150 pupils, special medical and dental examinations have been carried out every year for several years. Height and weight measurements have been made every six months by the same person on the same instrument on each occasion. Earlier height-weight data were available on many of the children, but were not used

because of the uncertainty of instruments and technique. The medical procedures have been described (6).

Wetzel Grids have been plotted for each child and the medical-dental results summarized for children who had at least 3 points on the chart, according to whether they were (*a*) staying in the channel of the Grid, or (*b*) descending out of the original channel (a deviation supposed to imply trouble). This corresponds approximately to a loss of 1 channel width or more per 10 levels of advancement. A small third group who were up-grading or moving into a higher channel are not recorded here, except the few from B3 and B4 Channels. The medical and dental results obtained following the latest height-weight records are summarized for each group.

Results

Table Showing More Children With Unhealthy Conditions, With a Growth Curve (*a*) in the Wetzel Grid Channels, than (*b*) descending out of the channel.

	In Channel	Descending
Total number of children	461	88
Number of children with unhealthy findings (excluding dental)	328 (71%)	60 (68%)
Underweight (10% or more)	31 (7%)	11 (12%)
Overweight (10% or more)	53 (12%)	15 (17%)
Thinness	19 (4%)	5 (6%)
Marked dietary inadequacy or imbalance	13 (3%)	2 (2%)
Low haemoglobin	79 (17%)	13 (15%)
Riboflavin deficiency, definite or probable	56 (12%)	5 (6%)
Vitamin A deficiency, definite or probable	69 (15%)	3 (3%)
Ascorbic Acid (C) deficiency, definite or probable	5 (1%)	4 (5%)
Serum ascorbic acid less than 0.4 mg%	79 (17%)	10 (11%)
Carious teeth	411 (89%)	64 (73%)
Gingivitis	223 (48%)	39 (44%)
Below average blood pressure	63 (14%)	8 (9%)
Respiratory infections (observed)	55 (12%)	12 (14%)
Enlarged or infected tonsils, or both	60 (13%)	15 (17%)

Definitions

Underweight and Overweight were judged by the Baldwin-Woods Tables published by the Metropolitan Life Insurance Company.

Thinness includes those 10% or more underweight and who have a standardized measurement of the skin plus subcutaneous tissue as follows:

Males, 5–11 years, 7 mm. or less; 12–17 years, 5 mm. or less.
Females, 5–11 years, 8 mm. or less; 12–17 years, 9 mm. or less.

Dietary Inadequacy. A diet is here called inadequate if a one-week food record shows that the following amounts or less are eaten for any four of the following eight groups of foods. (These amounts are sometimes the minimum stated in *Canada's Food Rules*, and sometimes less than half the minimum.)

(1) Milk: 128 oz. (for children) weekly.
(2) Fruit—citrus or tomatoes: 3 servings a week.
(3) Vegetables—potatoes: 3 servings a week.
(4) Vegetables—others: 6 servings a week.
(5) Cereals (except bread), whole-grain: 3 servings a week.
(6) Bread: 24 slices of white or 12 slices of brown a week.
(7) Meat and alternates: 3 servings a week.
(8) Vitamin D: 3 servings a week.

Low Haemoglobin: A person is compared against the results for his own group, but in general all children (under 12 years) with a reading below 11.2 grams per 100 ml. of blood are considered to be too low (read on a Cenco photelometer, calibrated in our own laboratory).

Riboflavin, vitamin A, and ascorbic acid deficiences are judged by combining dietary, clinical, and laboratory findings as described in the Canadian Medical Association Journal, 1950, *63*: 1.

Carious teeth and gingivitis: As ascertained by a dentist.
Low blood pressure (these readings are below normal distribution in our series):

Age	5—68/32 to 58/22	Age	11—84/44 to 74/34
"	6—66/46 to 56/36	"	12—84/48 to 74/38
"	7—68/34 to 58/24	"	13—84/52 to 74/42
"	8—70/42 to 60/32	"	14—86/48 to 76/38
"	9—70/38 to 60/28	"	15—94/50 to 84/40
"	10—72/48 to 62/38	"	16—94/54 to 84/44

Discussion

The table shows that 461 children were proceeding in the channel, on at least 3 weighings, while 88 children were descending. There was about the same *percentage* of defects in each group, but the "in channel" group was so much larger that more actual pupils are involved there. If the Grid had been used as a basis for referring pupils to a physician, large numbers of pupils, suffering from a variety of defects, would have been missed; this statement is true even when items are excluded that a nurse could already have detected. However, the possible use of Wetzel Grids as a part of a school health system is not under discussion here.

Summary

Wetzel grids were prepared for about 600 children in 6 different schools scattered across Canada from Nova Scotia to British Columbia, and measured every six months. After at least 3 points were on the Grids, a medical and dental examination for specified conditions, including various aspects of malnutrition, was made. There were more children suffering unhealthy conditions among the group proceeding in the channels of the Grid than among the group descending below their original channels. In other words, the Wetzel Grids did not indicate the commonest disorders found in this group of children, namely carious teeth, gingivitis, low hæmoglobin, vitamin A deficiency, riboflavin deficiency, overweight. It was concluded that the Wetzel Grid could not be useful in the large nutritional studies, of which this is only a part.

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The Use of Calcium Alginate Soluble Wool for the Examination of Cleansed Eating Utensils

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EARLY specimens of calcium alginate (soluble compound) contained lauryl pyridinium bromide, a quaternary ammonium compound that was bactericidal (1). However, the manufacturers (2) were later able to produce calcium alginate that was relatively free of this substance, which enabled Higgins to report on the comparison of the seaweed derivative with cotton wool as swabbing materials. It was reported that, when using *Micrococcus pyogenes, var. aureus,* the recovery with the calcium alginate swabs was almost double that experienced with cotton wool swabs (90.7 and 49.9 per cent respectively); when using *Escherichia coli,* the recovery rate dropped, but still remained in favor of the calcium alginate, with 89.9 per cent versus 67.0 per cent for the cotton wool. These figures are based on an exacting surface-plate counting method.

With this information at hand, it was decided to test calcium alginate under less rigid standards to see if it would perform as well under conditions other than those of a well-controlled laboratory.

Experimental Procedure

Masses of calcium alginate and absorbent cotton wool weighing approximately thirty milligrams were placed on No. 12 stainless steel wire seated in No. 0 rubber stoppers. The swabs were autoclaved at fifteen pounds of pressure for twenty minutes and then dried in the autoclave by vacuum.

A freshly isolated strain of beta haemolytic *Micrococcus pyogenes, var. albus,* was standardized by Brown's tubes and diluted to give final concentrations of approximately 3500, 90, 600, and 900 organisms per milliliter. These dilutions were distributed into tubes arranged in pairs (1 ml to each tube). An alginate and a cotton swab were then placed into the tubes, one pair at the time, and the tubes were gently shaken for approximately thirty seconds. The excess moisture was removed from the swab by pressing it against the side of the

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The opinions expressed are those of the authors and do not constitute and convey an endorsement by the Bureau of Medicine and Surgery of the U.S. Navy.

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tube as the swab was withdrawn. The swabs were then placed in tubes containing 9 ml of one-quarter strength Ringer's solution (3). After all swabs had been thus treated, one milliliter of the 10% sodium hexametaphosphate solution required to dissolve the calcium alginate was added to each tube. The tubes were then shaken vigorously in pairs until the calcium alginate had dissolved, this usually requiring from 20–40 seconds. One milliliter of these suspensions was then placed in sterile Petri dishes and overlayed with 3–5 ml. of tryptone-glucose extract agar. The plates were rotated in a clockwise and counter-clockwise direction to insure proper mixture, allowed to harden, inverted, and incubated for 24 hours at 37.5°C. Counts were then made by use of a Quebec Colony Counter. The results are shown in Table I.

TABLE I

Tube No.	Organisms per ml (appr.) 3500 C	3500 A	90 C	90 A	600 C	600 A	900 C	900 A
1	(1130)	2500	(60)	360	(170)	210	(250)	450
2	(440)	2800	(40)	120	(90)	200	(260)	360
3	(1300)	2700	(50)	70	(140)	190	(850)	890
4	(800)	4000	(40)	60	170	(140)	(360)	560
5	(800)	2500	(40)	50	(40)	400	(50)	390
6	(380)	2500	(20)	100	(100)	110	700	(670+)
7	(410)	3700	(50)	70	(100)	140	450	(430+)
8	(620)	3400	(10)	110	(110)	290	(200+)	340
9	(1300)	2100	(20)	50	(180)	410	(270)	710
10	—	—	—	—	(170)	270	(290)	790
11	—	—	—	—	(120)	210	(340)	450
12	—	—	—	—	(90)	170	(400+)	830
13	—	—	—	—	(210)	250	(250)	450
14	—	—	—	—	—	—	(350)	610
Control	neg	neg	neg	neg	neg	neg	neg	broken

C — cotton wool swab.
A — calcium alginate wool swab.
Figures in parantheses indicate the lesser recovery.
Figures followed by a plus sign indicate that counting above the number shown was not valid due to the overlapping of colonial peripheries.

Each suspension was made from a thirty-hour-old growth.

As can be seen in the table, there are two instances in which the alginate swabs gave a lesser recovery than the corresponding cotton swabs. However, in these two cases, there were colonies on the pour plate of the alginate swab whose peripheries were contiguous with others, thus making an accurate count above the number shown invalid: the plus sign following these two numbers indicates this condition.

Actually, the fourth pair of swabs in the 600 organisms/ml suspension is the only case out of the forty-five pairs of specimens where there was a direct difference, with the cotton swab giving a greater recovery than the alginate swab.

In view of these results, and those published by Higgins, it was decided that field testing of the material should be undertaken. Although a relatively unknown quantity (calcium alginate) was being used to determine an unknown

(bacterial counts of cleansed eating utensils), further indication of the ability of calcium alginate was desired before planning long-range investigative studies of the material. Consequently, ninety-three pairs of specimens were taken from cleansed eating utensils after the morning, noon, and evening meals. In these specimens, the cotton wool swab was placed in a buffered solution as recommended by the U.S. Public Health Service (4) instead of the Ringer's solution. The results of these tests are shown in Table II.

TABLE II

Date	Meal	Cup		Glass		Plate		Fork		Spoon	
		C	A	C	A	C	A	C	A	C	A
3/19	B	14	(125)	6	0	X	22	29	(117)	7	(98)
3/21	B	1	(13)	3	(10)	3	(13)	17	(83)	10	(X)
3/23	B	6	(15)	107	(130)	—	3	14	(18)	X	38
3/26	B	22	(35)	3	sp.	2	(52)	17	(73)	3	(40)
3/28	B	5	(10)	11	(45)	—	—	29	(264)	140	120
3/31	B	43	18	—	—	4	(8)	5	(22)	6	(33)
4/4	B	4	(13)	8	(15)	X	18	25	(50)	X	X
		Glass		Plate		Fork		Spoon			
3/19	L	7	(8)	6	(20)	4	(13)	5	(15)		
3/21	L	4	(8)	1	(3)	3	(8)	4	(15)		
3/23	L	6	(10)	3	(5)	X	20	X	25		
3/26	L	2	(18)	3	(8)	1	(10)	4	(13)		
3/28	L	2	(8)	5	(10)	52	(X)	70	(80)		
3/31	L	4	(10)	3	(5)	40	22	3	(8)		
4/3	L	5	(20)	5	(8)	7	(20)	20	(30)		
4/7	L	24	(30)	20	(35)	56	(113)	X	75		
3/19	S	8	(25)	3	(8)	94	(160)	7	(20)		
4/3	S	26	(100)	124	(92)	69	(92)	72	20		
4/6	S	X	75	X	70	56	(X)	8	(30)		
4/7	S	X	108	3	(28)	X	225	25	20		
4/8	S	7	(18)	X	13	93	(375)	83	8		
4/9	S	127	18	X	22	X	78	21	(X)		
4/10	S	X	X	4	(20)	50	(93)	16	(43)		

Code:
C—cotton wool swab.
A—calcium alginate swab.
sp.—spreader.
B—breakfast.
L—lunch.
S—supper.
X—too numerous to count.
Figures in parentheses represent the calcium alginate swabs that gave higher counts than did their companion cotton wool swab.

As can be seen in the table, two pairs of swabs were invalidated, one due to the breakage of the companion swab, and the other due to the development of a spreader colony on one of the plates. Thus ninety-one pairs of swabs remain valid for comparison. Of these, it is interesting to note that higher recoveries were experienced on the alginate swab in sixty-seven of the cases, or 73.6% of the total. Placed on a meal basis, the alginate gave better recovery than the cotton in 87.5% of the specimens taken at the noon meal, in 75.0% of the specimens taken at the morning meal, and in 53.3% of the specimens taken at the evening meal.

In view of this information, more specimens were taken, giving a final total of 169 pairs of swabs, of which a total of five pairs were invalidated due to

breakage or contamination. Of the remaining 164 pairs, higher counts were obtained on the calcium alginate swab in 129 instances, or a total of 78.8% of the specimens taken.

In comparing colony counts, it was observed that when the calcium alginate swab yielded a larger count, these counts were two or more times larger than those obtained on the companion cotton wool swab in approximately 83% of the comparisons.

Discussion

The reason for the variation in recovery from meal to meal, as shown in Table II, is not understood at this time. Further studies are now in progress to determine if meal content has any effect upon the efficiency of calcium alginate for use in dishwashing investigations. However, the data indicate no definite trend as yet.

Deviations from standard methods were used in this experimental work. These deviations are as follows: (1) an incubation temperature of 37.5°C. instead of 37°C. was used; (2) stainless steel wire was used as a swab holder instead of wooden applicator sticks; (3) incubation was for only twenty-four hours instead of forty-eight; and (4) 3–5 ml of agar instead of 10 ml was used for the pour plates. The reason for deviation No. 2 is that, in the experience of the authors, better results are obtained with stainless steel wire as compared with wooden applicator sticks; the latter became warped and soft due to autoclaving, thus making swabbing difficult, if not inefficient. The reason for adopting the other three deviations is one that is of interest to the singular situation provided by a naval service and their adoption has no bearing on the problem per se. Even so, it is well to note that calcium alginate still performed much better than cotton wool.

Summary

The results of laboratory and field tests for comparing cotton wool swabs with calcium alginate swabs are presented.

Data so far indicate that calcium alginate is the superior material for this type of work, and is the material of choice where a selection is possible.

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The "Filter Paper" Method for Collecting and Transporting Stools to the Laboratory for Enteric Bacteriological Examination

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IN 1944 Dold and Ketterer in Germany investigated the survival of Salmonellae and Shigellae in inoculated normal fluid stools and in the faecal material dried on filter paper. They concluded that the pathogens survived longer in the dry material, when both types of specimen were kept at room temperature. *S. typhi* survived for 80 days on paper, compared with 4 days in the fluid stool. *S. paratyphi B* remained viable for 174 days on paper, while it failed to survive after 11 days in the fluid material. *Shigella* organisms died in 9 days in the stool but were recovered after 30 days from the paper.

In 1950 L. K. Joe applied the filter-paper technique in dispatching positive stool specimens to the laboratory. The results obtained using the paper specimens were in close agreement with those obtained in Dutch Indonesia when employing the fresh material.

Both Joe and the German workers observed that the pathogens outlived the normal flora in the dried material, and Joe reported also that a relative enrichment of pathogens took place during shipment of the specimens to the laboratory.

In August 1951 our Department was asked to investigate an outbreak of paratyphoid fever at a summer fish camp in the Northwest Territories. Facilities for collecting specimens of some 110 employees at the camp were poor, and the paper technique was given a trial. These specimens consisted of faecal smears on strips of ordinary desk blotting paper, wrapped individually in Cellophane. A large number of specimens were mailed in one heavy envelope. Over a period of three weeks 211 specimens were received, of which 144 were put up in duplicate at our request, one in glycerol saline and the other on blotting paper. The average specimen was five days en route and some took nine days to reach Ottawa.

The organism isolated was *S. paratyphi B*. It was noted that when the specimens were positive, the pathogen was found almost in pure culture on the paper strip, while its parallel in glycerol saline exhibited an abundance of Proteus, paracolons, and other coliforms, in addition to *S. paratyphi B*. Our observations on this outbreak indicated that the paper-strip method gave us as good recovery of the pathogen as did the glycerol-saline method.

Presented at the nineteenth annual Christmas meeting of the Laboratory Section, Canadian Public Health Association, held in Quebec on December 15 and 16, 1952.

Such encouraging results led us to investigate the usefulness of the method for collecting stools containing other pathogens. Unfortunately, we were able to obtain only a few stools from cases or carriers, since most laboratories approached seldom received fresh (unpreserved) specimens, and thus could not fulfill the requirements for this investigation. We were able, however, to obtain a fresh stool from an active case of typhoid fever as well as one from a carrier. Faecal paper smears were made from each specimen and the remainder was preserved in glycerol saline. Fresh specimens were also obtained from two cases of *Sh. sonnei* dysentery. One of these specimens was put up in two ways: immediately on receipt of the specimen and after 48 hours' standing at room temperature. The results of survival are shown in Table I. In this table, Proteus, paracolons, and any normal inhabitants of the intestine are grouped under "other flora." As can be seen, in both the *S. typhi* case and carrier paper specimens, the non-pathogens disappeared quite rapidly, while the pathogen survived for 21 days in the case and 14 days in the carrier. In glycerol saline the pathogen survived for only 7 days but other flora persisted for 14 to 21 days.

Serological tests indicated that *S. typhi* remained smooth and contained an appreciable amount of Vi antigen on each isolation from the dry material.

Sh. sonnei also outlived the non-pathogens on the paper strip but remained viable longer in the glycerol saline than on paper. It was not recovered after 7 days in Case T1 but yet was still abundant in Case V after this period. In Case T2, where the strips were prepared from the 48-hour-old stool, the organisms were not recovered after 24 hours, but were still viable in the glycerol saline after 7 days. This suggests that paper smears should be made as soon as possible after the stool is passed.

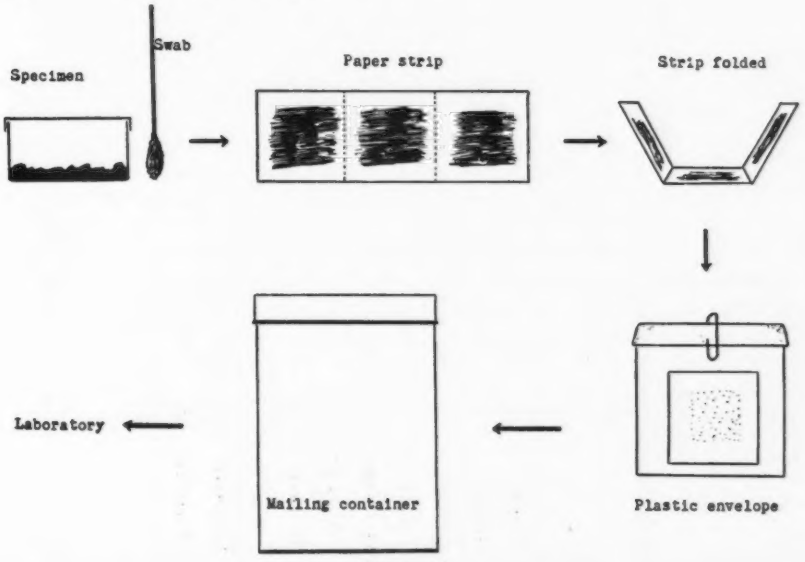

FIGURE 1
Stool Collection and Transportation.

TABLE I

SURVIVAL OF ORGANISMS IN STOOLS FROM CASES AND CARRIERS

	METHOD	72 hrs.		7 days		14 days		21 days	
		Pathogen recovered	Other flora	Pathogen recovered	Other flora	Pathogen recovered	Other flora	Pathogen recovered	Other flora
S. typhi (Case)	Gly. sal.	+++	+++	+	++	0	+++	0	+
	Strip	+++	0	+++	0	+++	0	+++	0
S. typhi (Carrier)	Gly. sal.	+	+++	+	++	0	+	0	0
	Strip	+++	0	+++	0	+++	0	0	0
Sh. sonnei (Case T1)	Gly. sal.	++	+++	+	+++	+	+++	.	.
	Strip	+	0	0	0	.	.	.	.
Sh. sonnei (Case V)	Gly. sal.	+++	+++	++	+++	++	+++	0	0
	Strip	++	+	++	0	0	0	.	.
Sh. sonnei (Case T2)	Gly. sal.	+	+++	+	+++	0	0	.	.
	Strip	0	+	0	0	.	.	.	.

+ = < 10 colonies
++ = > 10 & < 50 colonies
+++ = > 50 colonies

We have devised a means of simple collection as well as safe transportation to the investigating laboratory. Figure 1 shows the method we have employed and which has yielded satisfactory results. Non-sterile strips of filter paper (No. 1 Whatman) approximately 6″ × 2″ are smeared in three places with the fresh faecal material, giving smears approximately 1½″ square. A cotton swab is dipped into the material and rolled over each area. It is not necessary to paste the material on the strip, but too light a smear is not desirable. The smeared strip is allowed to dry rapidly at room temperature in a dry atmosphere, then folded inwards and packaged in a plastic envelope. The top of the envelope is folded and closed with a paper clip to which a paper tag with the necessary information on the case is attached. A large number of such speci-

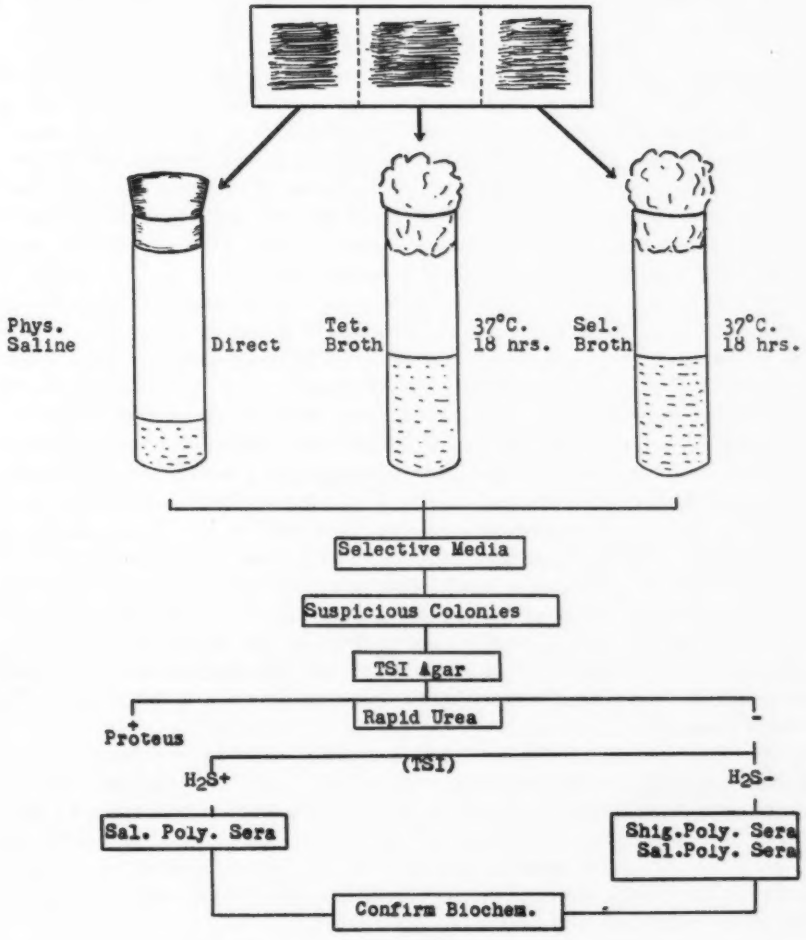

FIGURE 2
Laboratory Examination of Faecal Strips.

mens may then be placed in a metal or metal-reinforced mailing container, and shipped by air or by rail to the laboratory.

Figure 2 shows the method of treatment at the laboratory. With forceps a strip is removed from the envelope while an assistant clips off the smears, placing one in a few ml. of physiological saline, one into tetrathionate broth, and the third into selenite. After an hour the saline tube is well shaken and the suspension plated on selective media. Plating from the enrichment broths is carried out after incubation at 37° C. for 18–24 hours.

Colony selection and biochemical screening are followed by serological screening, employing Salmonella or Shigella polyvalent sera. The growth from the screened positive Triple Sugar Iron Agar slopes may be used in serodiagnosis.

Further Experiments

Investigations were also carried out using a normal stool, emulsified in saline. Five-ml. portions of this material were then inoculated with 1 ml. of four different dilutions of a 24-hour culture of each of four common enteric pathogens found in Canada, viz. *S. paratyphi B*, *S. typhi-murium*, *Sh. flexneri 2a*, and *Sh. sonnei*. The resultant concentration of organisms per ml. stool was approximately 100×10^6, 100×10^3, 1000, and 100, respectively. Paper strips and glycerol-saline preparations were put up as before and the same method of treatment and analysis of isolates was used.

It was only with the material containing the highest concentration of organisms, i.e. 100×10^6/ml, that *S. paratyphi B* and *S. typhi-murium* were recovered from the paper specimens even after 24 hours. Lower concentrations survived longer in glycerol saline. Table II shows the survival when employing this higher concentration. These pathogens were recovered from the strips after 21 days. The disappearance of "other" flora from the paper specimens followed a pattern similar to that observed with the positive stools previously discussed. Other flora were still viable in the glycerol-saline specimens after 21 days but had decreased in numbers. Towards the end of the period of investigation viable organisms were recovered from the strips only after passage through enrichment broth. This was also true of the glycerol-saline specimens where lower concentrations of inoculum were used. Thus for the two Salmonellae used it would appear that, in the inoculated stools, the filter-paper technique was as satisfactory as the glycerol-saline method, provided there was a sufficiently high initial concentration of organisms in the faecal material.

Our observations on the specimens inoculated with the two *Shigellae* were rather surprising in that we were unable to recover the organisms from the strips four hours after they were prepared, while both survived for 14 days when the specimens were preserved in glycerol saline. The non-pathogen flora survived for the same length of time. Thus there was no relationship between the results obtained on the normal positive stools and those on the inoculated stools when collected by this method.

Further observations were made using the normal stool inoculated with the same concentrations of organisms but without preservation in glycerol

TABLE II

SURVIVAL OF ORGANISMS IN INOCULATED STOOLS CONTAINING 100×10^6 PATHOGENIC ORGANISMS PER ML.

	METHOD	4 hrs.		7 days		14 days		21 days	
		Pathogen recovered	Other flora	Pathogen recovered	Other flora	Pathogen recovered	Other flora	Pathogen recovered	Other flora
S. paratyphi B	Gly. sal.	+++	+	+++	++	+++	++	++	+
	Strip	+++	0	++	0	++	0	+	0
S. typhimurium	Gly. sal.	+++	+	+++	++	+++	++	++	+
	Strip	+++	0	+++	0	++	0	+	0
Sh. flexneri 2a	Gly. sal.	+++	++	+	++	+	++	0	0
	Strip	0	0	0	0				
Sh. sonnei	Gly. sal.	+++	+	++	+++	++	++	0	0
	Strip	0	0	0	0				

TABLE III

SURVIVAL OF ORGANISMS IN NORMAL STOOL WITHOUT ANY PRESERVATIVE

	48 hrs.		72 hrs.		14 days		21 days	
	Pathogen recovered	Other flora	Pathogen recovered	Other flora	Pathogen recovered	Other flora	Pathogen recovered	Other flora
S. paratyphi B	+++	++	+++	+++	++	+++	++	+++
S. typhi-murium	+++	++	+++	+++	++	+++	+	+++
Sh. flexneri 2a	+	+++	0	+++	0	+++	0	0
Sh. sonnei	++	+++	+	+++	0	+++	0	+++

+ = <10 colonies
++ = >10 & < 50 colonies
+++ = >50 colonies

saline. Table III shows the survival of *S. paratyphi B* and *S. typhi-murium* for 21 days, with a gradual decrease in numbers paralleled by an increase in other flora over the same period. *Sh. flexneri*, on the other hand, died off in 72 hours, while "other flora" increased in numbers up to 14 days but were not recovered after 21 days. *Sh. sonnei* remained viable for 72 hours but had disappeared from the specimen after 7 days. Other flora in the specimen inoculated with *Sh. sonnei* were still abundant after 21 days.

Finally, tests were carried out by applying 2×10^6 and 2×10^3 viable organisms, respectively, of each of these four organisms to similar strips of paper. The lower concentration of 2×10^3 organisms failed to survive for four hours, but when 2×10^6 organisms were applied there was a fairly high rate of survival of *S. paratyphi B* and *S. typhi-murium* for 21 days. The *Shigellae*, on the other hand, lost their viability within 4 hours, as shown in Table IV.

TABLE IV

SURVIVAL OF PURE CULTURES ON FILTER PAPER STRIPS

ORGANISM	4 hrs.	72 hrs.	14 days	21 days
S. paratyphi B	+++	++	++	++
S. typhi-murium	+++	++	++	++
Sh. flexneri 2a	0	.	.	.
Sh. sonnei	0	.	.	.

+ = < 10 colonies
++ = > 10 & < 50 colonies
+++ = > 50 colonies

Media employed

SS agar and MacConkey agar were used for direct plating and plating after enrichment. Both media were equally good for the recovery of *Salmonellae*, but MacConkey agar proved superior for *Shigellae*.

Tetrathionate and selenite enrichment broths proved equally satisfactory for *S. paratyphi B* and *S. typhi-murium*, but tetrathionate gave far better results with *S. typhi*. Selenite, on the other hand, was preferred for the isolation of Shigellae.

DISCUSSION AND SUMMARY

It would appear from the results obtained that the filter-paper method of stool collection from cases of Salmonella infection is at least as satisfactory as the usual 30% glycerol-saline method. The method should prove extremely practical where a large number of stool specimens are to be collected, especially when the point of collection is some distance from the investigating laboratory. The method is both inexpensive and simple. Transportation is easily effected either by air or by rail. The biochemical and antigenic characters of the organisms are unaffected. Isolation and identification of the pathogen is perhaps simpler from the dried material, due to the fact that many of the normal

intestinal flora die during shipment, leaving relatively more pathogens in the dry specimen. This method of stool collection, however, appears less satisfactory for Shigella stools, and in this respect we were unable to confirm the findings of Dold and Ketterer and of Joe.

It is difficult to correlate the results using normal positive Shigella stools with the results obtained through using normal stools inoculated with Shigella organisms. Normal stools may contain phages which may prove lytic for Shigellae. In our experiments we noticed many colonies showing marked phage activity. The normal intestinal bacterial flora, if present in abundance, may produce substances inhibitory for these pathogens. Nissle (1916) in Germany postulated that antagonistic strains of *E. coli* are important in the resistance of humans to enteric infection. Gratia (1932) first clearly demonstrated the production of a thermo-stable antibiotic by a strain of *E. coli*. Halbert (1948) from the University of North Carolina has reported on the relation of antagonistic coliform organisms to Shigella infections through the production of antibiotic substances to which Shigella are sensitive. It is possible, therefore, that the poor results obtained with the paper-strip method on Shigella-inoculated stools may be due to a concentration of such antibiotic substances which are lacking in the stools from active cases.

It was unfortunate that there was insufficient material available to compare the survival of pathogens in unpreserved uninoculated positive stools with the glycerol-saline and paper-strip specimens. This was, however, primarily an experiment to compare the glycerol-saline with the paper-strip method.

Paper specimens on arrival at the laboratory should be handled with caution due to the dry nature of the material. Seeding operations should preferably be carried out in some form of inoculation cabinet.

For the isolation of pathogens from the faecal material, the use of one selective plating medium such as SS agar and one less inhibitory medium such as MacConkey agar is advised. Where possible, two enrichment media such as tetrathionate broth and selenite broth should be employed.

Conclusion

This study was undertaken for the purpose of investigating the merits of collecting faecal material for enteric bacteriological examination by the filter-paper technique. Our observations with cases of Salmonellosis lend support to the findings of L. K. Joe. Faecal material from cases of Shigellosis may be collected in this manner provided the time between collection and examination is not over 7 days.

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Canadian Journal of Public Health

THE INCREASING IMPORTANCE OF THE LABORATORY IN THE PRACTICE OF MEDICINE

TWO CURRENT PUBLICATIONS record in a striking manner the progress in public health. One is the December issue of the Ontario Medical Review, outlining the work of the public health laboratory service in Ontario; and the other is the fortieth annual report of the Connaught Medical Research Laboratories in the University of Toronto. The first records the establishing of diagnostic services in 1890, and the second the preparation of essential serums, vaccines, and related biological products in 1914. Both were the first undertakings in these fields in Canada; in fact, the laboratory service established in the Department of Health of Ontario was the first public health laboratory to function on this continent. The start was made when Dr. J. J. Mackenzie, in a room in a building at the corner of Queen and Yonge Streets, Toronto, made the first examinations of dog brains for the evidence of rabies; and from the descriptions which he recorded it is evident that he saw the bodies which subsequently were described by Negri and are now considered to be pathognomic of that disease.

From a service with one part-time physician and a wash-up boy, housed in a single room and completing 1,250 examinations in the first year of operation, with no stated appropriation, laboratory services in Ontario have grown to an establishment of 400 persons responsible for two million examinations annually and requiring an appropriation of more than one million dollars. The services include bacteriology, serology, parasitology, identification of parasites, studies of fungus infections, virology, histopathology, haematology, and biochemistry. Ninety per cent of the examinations are conducted without charge to the individual. Supplementing the laboratory in Toronto, a branch laboratory was established in Kingston in 1904 and in London in 1911. Today there are few communities in Ontario lacking readily accessible, complete laboratory services. This has been accomplished by a system of seventeen regional laboratories, strategically located, with a central laboratory in Toronto.

The wide extent of the services rendered, and their provision through regional laboratories, indicate the interest of the physicians of the Province

and the ability of the Department to meet the constantly growing demands of the profession. The series of articles in the Ontario Medical Review, presenting the various aspects of laboratory services, show that there is no longer a line of demarcation between public health services and other clinical laboratory procedures essential in diagnosis.

The second report, that of the Connaught Medical Research Laboratories, records the remarkable achievements of that institution in rendering a medical public service through the preparation of essential biological products and the conduct of medical research. Closely associated with the Laboratories is the School of Hygiene, which provides both undergraduate and graduate instruction in public health, as well as conducting an extensive program of research. From five persons in 1914, the staff of the Laboratories has grown to more than 500; the preparation of products, from two in 1914 to more than 70; and the laboratory facilities from two rooms in the sub-basement of the Medical Building in the University of Toronto to a series of laboratories housed in four divisions. The greatest growth, however, has been in medical research. Last year sixty research projects were in progress.

These two publications not only draw attention to the increasing importance of the laboratory in the practice of medicine, but also cause us to realize how rapid has been the progress in the field of diagnostic services and in the preparation of new products. In the few decades covered by these reports, the practice of medicine has been advanced by the use of Insulin in diabetes and liver extracts in pernicious anaemia; the introduction of the sulphonamides, and of ACTH and cortisone in arthritis; the treatment of surgical shock with blood plasma and blood extenders; and the use of antibiotics, including penicillin and streptomycin, in treating infections.

Support for medical research is being extended both by official and voluntary agencies and by private benefactions. In 1914, when the work of the Connaught Medical Research Laboratories was established, there were no funds available for the support of research. Today, through the National Research Council, the Department of National Health and Welfare, the Defence Research Board, the National Cancer Institute, the Department of Veterans' Affairs, and other national agencies, more than two and a half million dollars are available annually for the support of studies in universities, hospitals, and other institutions in Canada. These grants are making possible studies of great value and are providing the opportunity for the training of research personnel. Through close co-operation on the part of the authorities in charge of the grants, the maximum use is being made of the available funds. In the past few years great progress has been made in providing essential equipment, so that the necessary facilities are now generally available for the conduct of effective research. In every Province laboratory facilities have been greatly extended, and in each special services have been developed to meet particular needs. The Federal Health Grants have been a highly important factor in the extension of these services and in the support of research. Appreciation of these grants is evidenced by the increase in the number of projects presented and by the allocation in full of the amounts available for the support of research.

INDUSTRIAL HYGIENE ABSTRACTS

Industrial Medical Services

THIS ARTICLE reviews the present position of industrial health services in Britain—the government departments engaged in this work, the scope of their investigations and research, and the type of research being undertaken by the Medical Research Council and certain university departments.

The factory department of the Ministry of Labour and National Service, dating from the year 1833, administers the Factory Acts. The 16 medical inspectors are stationed in large centres. Under them are 1,750 general practitioners who give part-time service as appointed factory doctors (previously called examining surgeons). These doctors examine all young entrants into industry, and periodically all workers engaged in specified dangerous processes. In addition, there are about 230 doctors employed whole-time in factory work and about 2,800 engaged part-time. These figures include the appointed factory doctors.

Among other medical services under government departments are that of the Post Office, in existence since 1855, the Mines Medical Service, the Ministry of Supply Medical Service, and the medical staff of the Ministry of National Insurance. Reference is made also to the work of the pneumoconiosis medical panels and to the medical service established in some of the newly nationalised industries.

The Medical Research Council has carried out much fundamental research into environmental conditions and into specific diseases, through its investigators of the Industrial Health Research Board and through other units dealing with industrial health, as for example, the industrial medicine research unit at the Birmingham Accident Hospital, and the unit for research on climate and working efficiency at Oxford.

Of increasing importance also are the educational facilities offered by different universities for the training of those interested in occupational health, and the activity of the Association of Industrial Medical Officers, branches of which have been established in various parts of the country.

Lancet, II, 442, 1952.

Work on the Land: Its Potentialities for Resettlement of the Disabled

SHORTER HOURS, specialisation, mechanisation, improved rural housing, and the certainty of regular remunerative employment, have made conditions of farm life of today easier than formerly. In this article the author re-examines the possibilities of various types of land work as occupations for the disabled. He draws attention to the advantages of specialized types of farming—more regular hours, better pay, and more opportunity to compensate for physical defects. He would advise trainees to specialise if possible and he indicates the suitability of certain types of land work.

The influence of mechanisation on British agriculture is significant in that the physical strain in almost every type of land work is relieved. Furthermore, the various types of machinery, such as tractors, provide jobs for operators, as do the workshops now maintained on many farms.

The author outlines the training schemes. The trainee applies through the Ministry of Labour and is then referred to one of the county agricultural committees. If accepted, he is trained for a minimum of a year by a selected farmer or market gardener who agrees to employ him for at least another year after his training. The committee is responsible also for finding living accommodation. Trainees receive a certain weekly allowance during the period of training.

Certain preliminary training considerations are indicated. The value of early physical reconditioning is stressed, also the advantage of reading certain suggested publications on farming and related subjects.

In selecting patients for land work, investigation should include thorough medical, social, and psychological study in order to ensure suitable disposition of cases.

George H. Dobney, Lancet, II, 492, 1951.

Margaret H. Wilton

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